Method and System for Providing
Wireless-Specific Services for a Wireless
Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
Sheet 1 of 16   Filed: July 18, 2001

FIG. 1

Method and System for Providing
Wireless-Specific Services for a Wireless
Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
Sheet 2 of 16   Filed: July 18, 2001

FIG. 2

START

100 — GENERATE SIGNALING MESSAGE
FOR WIRELESS EVENT

102 — FORWARD SIGNALING
MESSAGE TO MCF

104 — CONVERT SIGNALING
MESSAGE TO ESIP MESSAGE
FOR WIRELESS EVENT

106 — FORWARD ESIP MESSAGE TO
CALL AGENT FOR HANDLING

END

FIG. 3

START

120 — RECEIVE REGISTRATION
REQUEST FOR MOBILE

122 — REGISTER MOBILE

124 — REGISTERED?

UNREGISTER

CANCELLATION

TIME
EXPIRING

LOCATION
UPDATE?   YES

128   NO

126 — UNREGISTER MOBILE

END

START

300 — CALL SET UP

302 — RETRIEVE CALL TRIGGERS
FROM FEATURE SERVER

304 — DOWNLOAD WIRELESS
SPECIFIC TRIGGERS TO MCF

306 — DOWNLOAD SELECTED WIRELESS
SPECIFIC TRIGGERS TO GATEWAY

FIG. 10

308 — MONITOR CALL
FOR EVENTS   WIRELESS EVENT

310

CALL
TERMINATION

NOTIFY CALL AGENT

END

PROCESS EVENT

312

Method and System for Providing Wireless-Specific Services for a Wireless Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
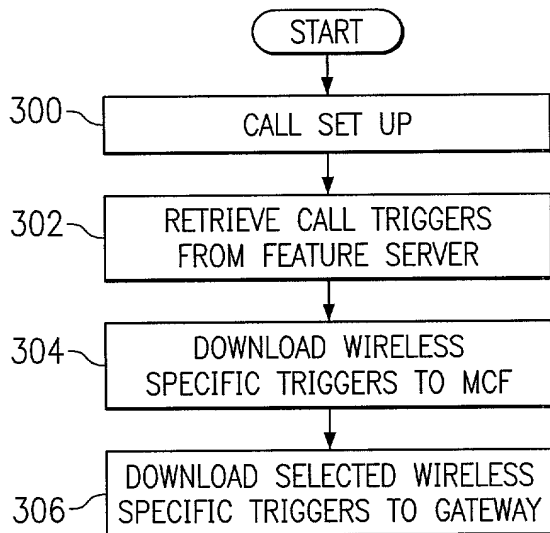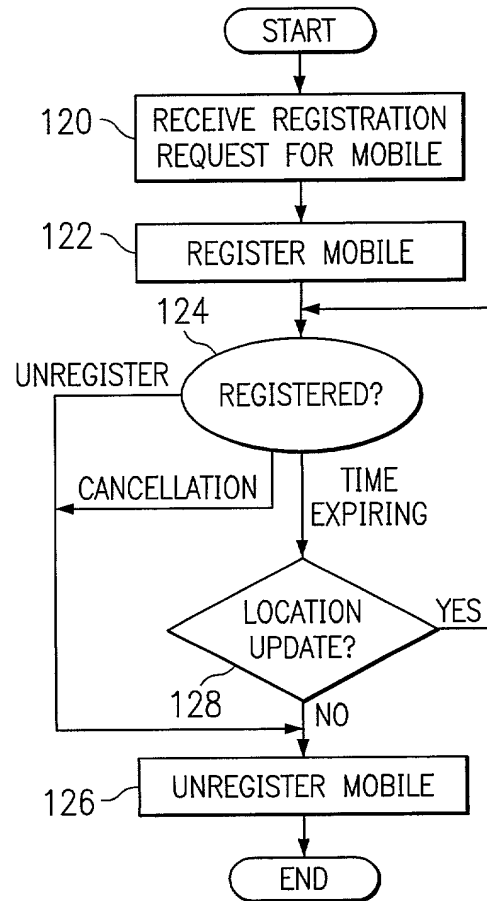Sheet 3 of 16   Filed: July 18, 2001

FIG. 4

SIP MESSAGES FOR BASIC SERVICES AND MOBILITY MANAGEMENT

MCF/CA INTERFACE EVENT	MCF/CA INTERFACE	SIP REQ/RESP	SIP HEADERS/ PARAMETERS	EVT (OPN)	SIP EXTENSION PARAMETERS	NOTES
MOBILE REGISTRATION (LOCATIONUPDATEREQ)	IS-634	REGISTER	FROM:MIN EXPIRE:X	NONE	ESN, CELLID	REGNOT SENT TO VLR/HLR FOR INITIAL REGISTRATION
MOBILE UNREGISTERS	IS-634	REGISTER	FROM:MIN EXPIRE:0	NONE	ESN	REGCANC SENT TO VLR/HLR
LOCATIONUPDATEREQ (LUR)	IS-634	REGISTER	FROM:MIN	LOCATIONUPDATINGREQ	ESN, CELLID	SUBSEQUENT LOCATION UPDATES
REGISTRATION CANCELLATION FROM HLR/VLR	IS-41	REGISTER	TO:MIN EXPIRE:0	NONE	ESN	REGN CANCELLATION RECEIVED BY CA WHEN MS MOVES TO ANOTHER SERVING MSC

140
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Method and System for Providing
Wireless-Specific Services for a Wireless
Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
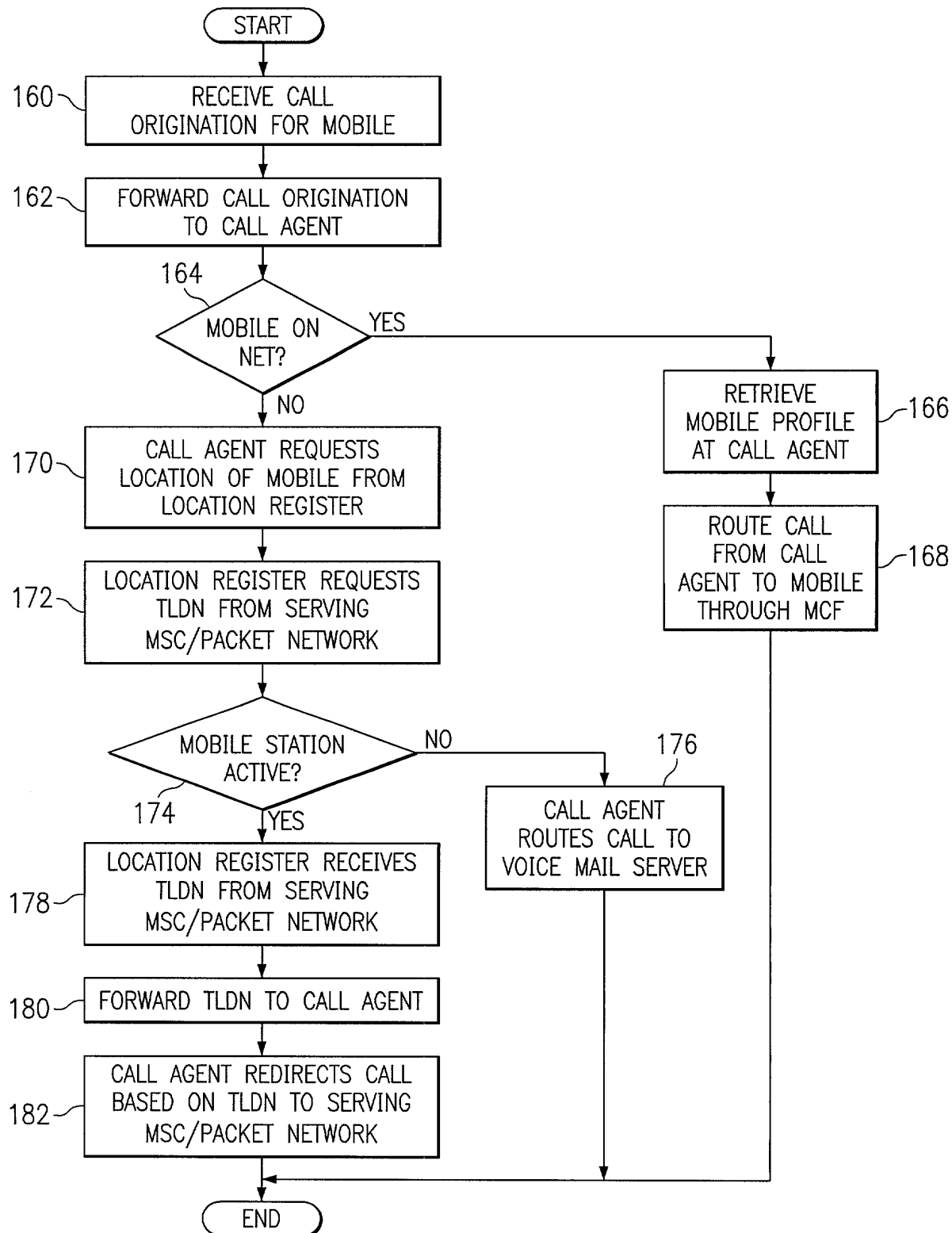Sheet 4 of 16   Filed: July 18, 2001

FIG. 5

START

160 — RECEIVE CALL ORIGINATION FOR MOBILE

162 — FORWARD CALL ORIGINATION TO CALL AGENT

164

MOBILE ON NET? — YES

NO

166 — RETRIEVE MOBILE PROFILE AT CALL AGENT

170 — CALL AGENT REQUESTS LOCATION OF MOBILE FROM LOCATION REGISTER

168 — ROUTE CALL FROM CALL AGENT TO MOBILE THROUGH MCF

172 — LOCATION REGISTER REQUESTS TLDN FROM SERVING MSC/PACKET NETWORK

MOBILE STATION ACTIVE? — NO

174   YES

176 — CALL AGENT ROUTES CALL TO VOICE MAIL SERVER

178 — LOCATION REGISTER RECEIVES TLDN FROM SERVING MSC/PACKET NETWORK

180 — FORWARD TLDN TO CALL AGENT

182 — CALL AGENT REDIRECTS CALL BASED ON TLDN TO SERVING MSC/PACKET NETWORK

END

Method and System for Providing Wireless-Specific Services for a Wireless Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
Sheet 5 of 16   Filed: July 18, 2001

FIG. 6

SIP MESSAGES FOR BASIC CALL HANDLING

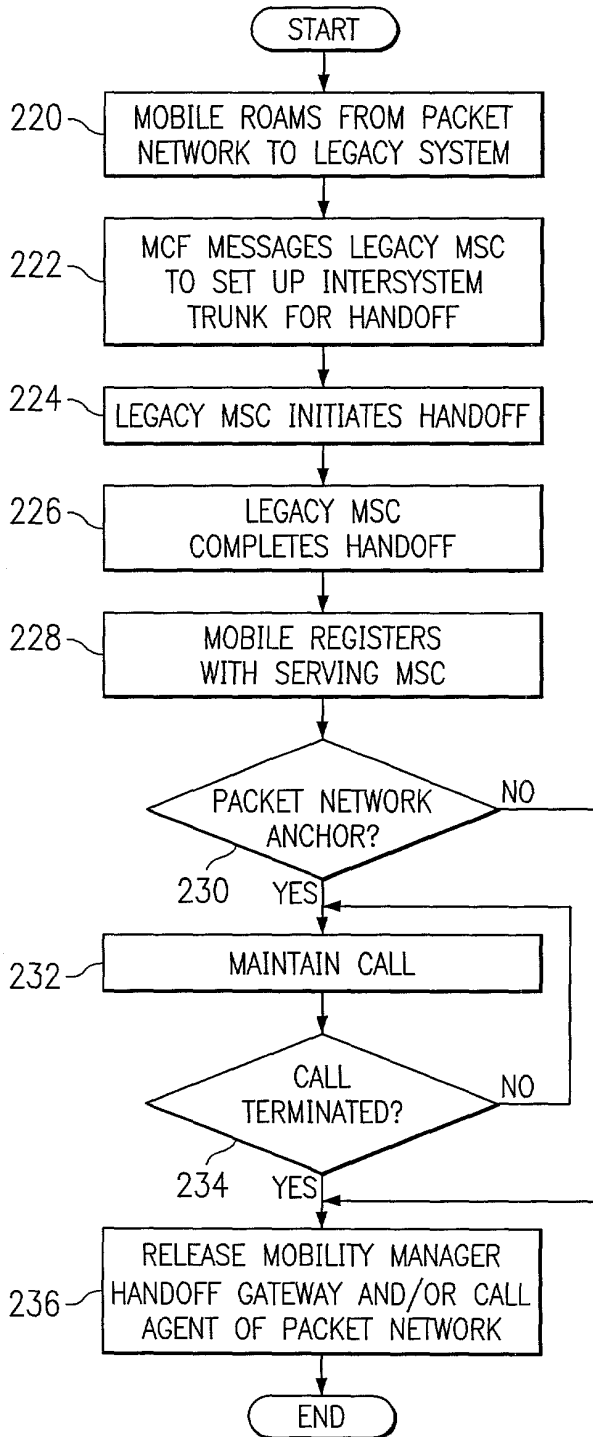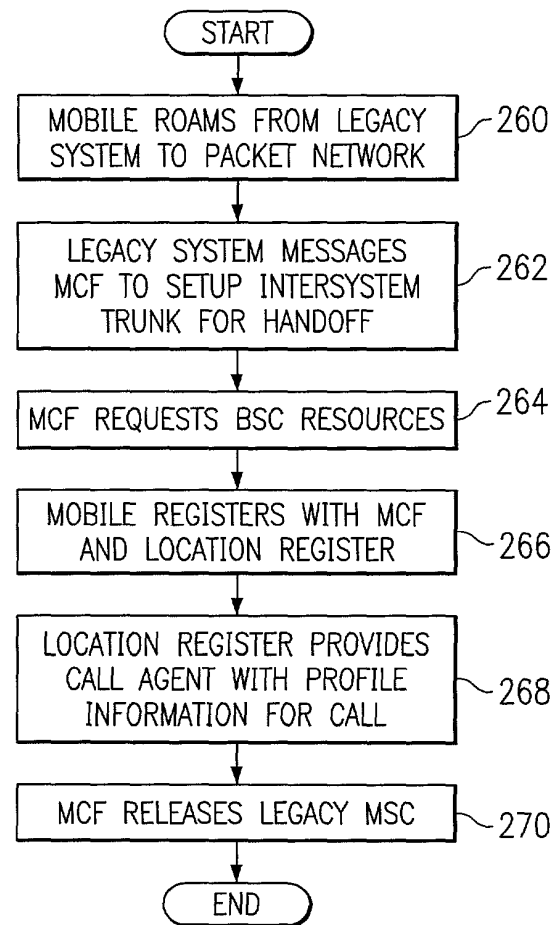| MCF/CA INTERFACE EVENT	MCF/CA INTERFACE	SIP REQ/RESP	SIP HEADERS/ PARAMETERS	EVT (OPN)	SIP EXTENSION PARAMETERS	NOTES
ROUTEREQ FROM HLR	IS–41	INFO	TO:MIN	ASSIGNTLDN	NONE	CA RECEIVES ROUTEREQ FROM HLR AND NEEDS TO ASSIGN A TLDN FOR AN ONNET MS
RESPONSE TO SIP INFORMATION		200 OK	FROM:MIN	ASSIGNTLDN	TLDN	MCF ASSIGNS THE TLDN AND NOTIFIES THE CA WITH THE MIN TO TLDN ASSOCIATION
TLDN TIMER EXPIRY	INTERNAL	INFO	FROM:MIN	DEASSIGNTLDN	TLDN	TLDN TIMER EXPIRED. TLDN IS RELEASED AND MIN NO LONGER ASSOCIATED TO TLDN. THE TLDN IS ALSO RELEASED WHEN THE CALL ARRIVES AT CA/MCF

200 — 202 — 204

Method and System for Providing
Wireless-Specific Services for a Wireless
Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
Sheet 6 of 16   Filed: July 18, 2001

FIG. 7a

(START)

220 — MOBILE ROAMS FROM PACKET
NETWORK TO LEGACY SYSTEM

222 — MCF MESSAGES LEGACY MSC
TO SET UP INTERSYSTEM
TRUNK FOR HANDOFF

224 — LEGACY MSC INITIATES HANDOFF

226 — LEGACY MSC
COMPLETES HANDOFF

228 — MOBILE REGISTERS
WITH SERVING MSC

PACKET NETWORK ANCHOR?   NO
230   YES

232 — MAINTAIN CALL

CALL TERMINATED?   NO
234   YES

236 — RELEASE MOBILITY MANAGER
HANDOFF GATEWAY AND/OR CALL
AGENT OF PACKET NETWORK

(END)

FIG. 7b

(START)

MOBILE ROAMS FROM LEGACY
SYSTEM TO PACKET NETWORK — 260

LEGACY SYSTEM MESSAGES
MCF TO SETUP INTERSYSTEM
TRUNK FOR HANDOFF — 262

MCF REQUESTS BSC RESOURCES — 264

MOBILE REGISTERS WITH MCF
AND LOCATION REGISTER — 266

LOCATION REGISTER PROVIDES
CALL AGENT WITH PROFILE
INFORMATION FOR CALL — 268

MCF RELEASES LEGACY MSC — 270

(END)

Method and System for Providing Wireless-Specific Services for a Wireless Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
Sheet 7 of 16   Filed: July 18, 2001

FIG. 8a

SIP MESSAGES FOR PACKET NETWORK TO LEGACY SYSTEM HANDOFF

MCF/CA INTERFACE EVENT	MCF/CA INTERFACE	SIP REQ/RESP	SIP HEADERS/ PARAMETERS	EVT (OPN)	SIP EXTENSION PARAMETERS	NOTES
HANDOFF REQUIRED FROM MS FOR HANDOFF TO LEGACY NETWORK	IS-634	NONE	NONE	NONE	NONE	MCF SENDS A FACILITIES DIRECTIVE2 REQUEST OVER IS-41 I/F WITH TARGET CELLID, MIN, ESN NUMBER AND HANDOFF CKT ID TO SETUP INTERSYSTEM TRUNK FOR HANDOFF TO LEGACY NETWORK AND START INTER-SYSTEM HANDOFF
FACILITIESDIRECTIVE2 RESPONSE FROM TARGET MSC	IS-41	NONE	NONE	NONE	NONE	RESPONSE FROM TARGET MSC AFTER IT INITIATES HANDOFF
MOBILEONCHANNEL RECEIVED BY MCF	IS-41	NONE	NONE	NONE	NONE	SENT BY TARGET (LEGACY) MSC AFTER COMPLETION OF HANDOFF TO LEGACY NETWORK
REGCAN FROM HLR RECEIVED BY CA	IS-41	REGISTER	TO:MIN EXPIRE:0	NONE	NONE	AFTER COMPLETION OF HAND OFF TO LEGACY NETWORK THE MS GETS REGISTERED AT ANOTHER SERVING MSC. NOTE CALL STILL REMAINS ACTIVE
FACILITIESRELEASE RECEIVED BY MCF	IS-41	BYE	FROM:MIN	NONE	NONE	IF THE MCF WAS THE ANCHOR MSC, FACILITIESRELEASE IS RECEIVED FROM THE SERVING MSC. THE HANDOFF CIRCUIT ON THE HANDOFF GATEWAY IS ALSO RELEASED AND CA IS NOTIFIED TO RELEASE THE CALL

280 282 284 286 288

Method and System for Providing Wireless-Specific Services for a Wireless Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
Sheet 8 of 16   Filed: July 18, 2001

FIG. 8b

SIP MESSAGES FOR LEGACY SYSTEM TO PACKET NETWORK HANDOFF

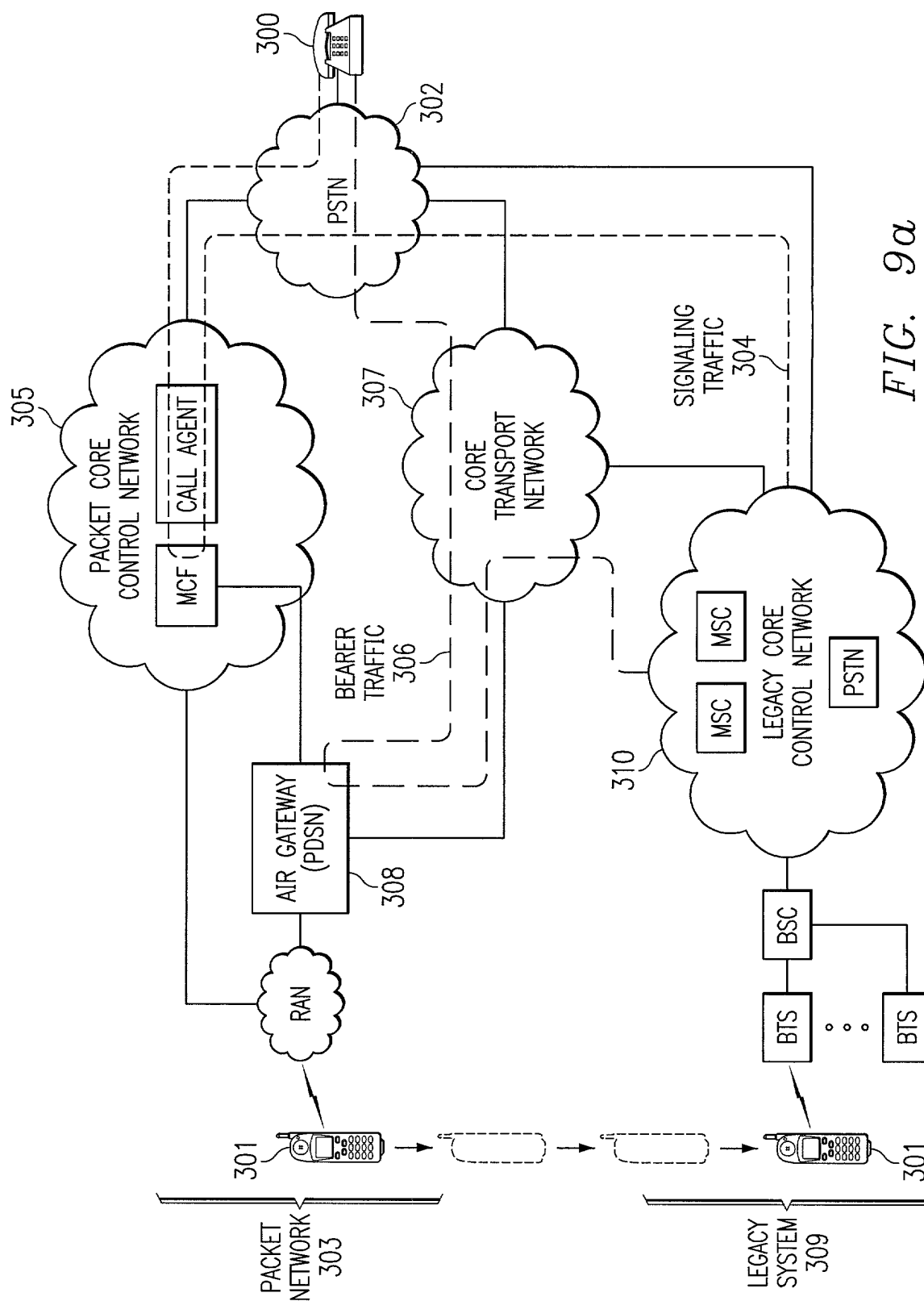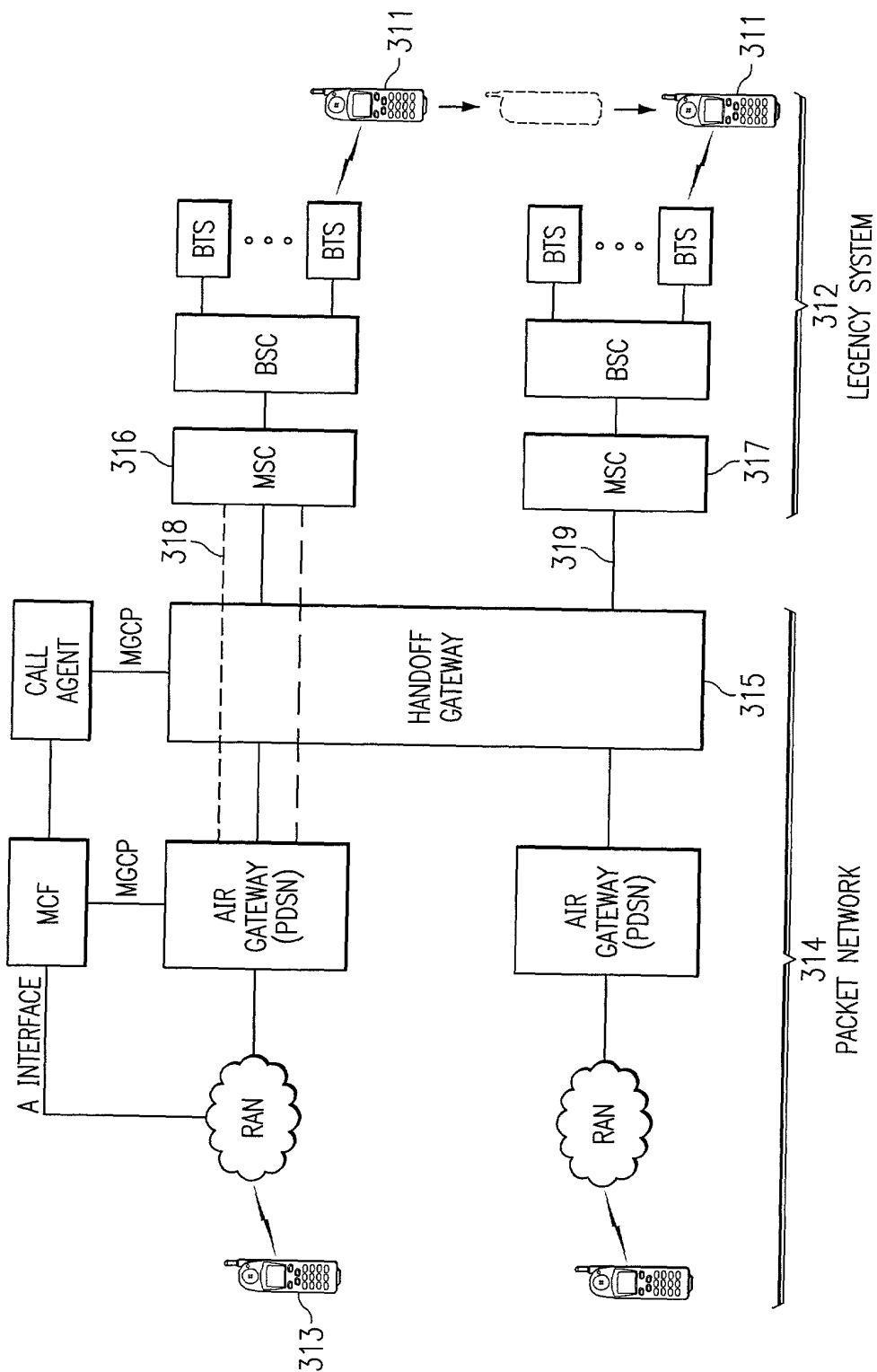| MCF/CA INTERFACE EVENT	MCF/CA INTERFACE	SIP REQ/RESP	SIP HEADERS/ PARAMETERS	EVT (OPN)	SIP EXTENSION PARAMETERS	NOTES
FACILITIESDIRECTIVE2 REQUEST FROM LEGACY MSC	IS-41	NONE	NONE	NONE	NONE	SERVING LEGACY MSC SENDS A REQUEST (WITH ESN, TARGETCELLID, HANDOFF CKT ID ETC) OVER IS-41 I/F TO MCF TO SETUP THE TARGET BSC. MCF SENDS HANDOFF REQUEST TO TARGET BSC TO ALLOCATE RESOURCES
FACILITIESDIRECTIVE2 RESPONSE TO LEGACY MSC	IS-41	REGISTER	TO:MIN	NONE	ESN, CELLID INFORMATION	WHEN A MS MOVES INTO THE PACKET NETWORK AREA, THE MS NEEDS TO BE REGISTERED IN THE MCF. MCF ALSO REGISTERS THE MS WITH THE HLR USING REGISTRATION NOTIFICATION REQUEST
HANDOFF COMPLETE	IS-634	NONE	NONE	NONE	NONE	AFTER COMPLETION OF HANDOFF TO PACKET NETWORK, I.E WHEN MS CAN SUCCESSFULLY BE ACCESSED BY BSC IN THE PACKET NETWORK, MCF WILL SEND MOBILEONCHANNEL TO THE CURRENT SERVING MSC. MCF THEN SENDS MOBILEONCHANNEL TO THE SERVING MSC. MCF ALSO SENDS REGNOT TO REGISTER THIS MS WITH HLR. WHEN REGNOT RESPONSE RECEIVED, CA IS NOTIFIED VIA SIP REGISTER MESSAGE WITH PROFILE INFORMATION

290

292

294

Method and System for Providing
Wireless-Specific Services for a Wireless
Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
Sheet 9 of 16   Filed: July 18, 2001

FIG. 9a

Method and System for Providing
Wireless-Specific Services for a Wireless
Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
Sheet 10 of 16   Filed: July 18, 2001

FIG. 9b

Method and System for Providing Wireless-Specific Services for a Wireless Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
Sheet 11 of 16   Filed: July 18, 2001

FIG. 11a

SIP MESSAGES FOR FEATURE ACTIVATION/DE-ACTIVATION

MCF/CA INTERFACE EVENT	MCF/CA INTERFACE	SIP REQ/RESP	SIP HEADERS/ PARAMETERS	EVT (OPN)	SIP EXTENSION PARAMETERS	NOTES
CM SERVICE REQUEST	IS-634	INVITE	TO:FEATURE CODE FROM:MIN	NONE	NONE	CA NOTIFIES HLR VIA FEATREQ MSG
FEATUREREQ RESPONSE FROM HLR	IS-41	200 OK 4xx	TO:MIN	NONE	TREATMENT CODE: CONFIRMATIONTONE OR ANNOUNCEMENT	MCF APPLIES THE TREATMENT BASED ON TREATMENT CODE AND RELEASES THE CALL. MCF WILL REQUEST IAG TO APPLY CONFIRMATION TONE BASED ON THE SIP RESPONSE

320, 322

FIG. 11b

SIP MESSAGES FOR ABBREVIATED DIALING

MCF/CA INTERFACE EVENT	MCF/CA INTERFACE	SIP REQ/RESP	SIP HEADERS/ PARAMETERS	EVT (OPN)	SIP EXTENSION PARAMETERS	NOTES
CM SERVICE REQUEST	IS-634	INVITE	TO:DIALED DIGITS FROM:MIN	NONE	NONE	NONE

324

Method and System for Providing Wireless-Specific Services for a Wireless Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
Sheet 12 of 16   Filed: July 18, 2001

FIG. 11c

SIP MESSAGES FOR CALLING NUMBER IDENTIFICATION PRESENTATION/RESTRICTION (CNIP/CNIR)

MCF/CA INTERFACE EVENT	MCF/CA INTERFACE	SIP REQ/RESP	SIP HEADERS/ PARAMETERS	EVT (OPN)	SIP EXTENSION PARAMETERS	NOTES
326 — CM SERVICE REQUEST	IS-634	INVITE	TO:CALLEDNUMBER FROM:MIN	NONE	NONE	CALL AGENT FORMATS THE CALLING NUMBER IN ISUP IAM MSG FROM CALLS TO PSTN ON LEGACY MSC USING FROM DATA AND USER PROFILES BASED ON CNIR FEATURE OF THE MS'S PROFILE
328 — ISUP IAM	PSTN/MSC I/F	INVITE	TO:MIN FROM:	NONE	NONE	CALL AGENT WILL INCLUDE THE FROM FIELD DATA IF THERE IS NO RESTRICTION ON PRESENTATION. ALTERNATIVELY A STRING OF UNKNOWN OR ANONYMOUS

FIG. 11d

SIP MESSAGES FOR CALL FORWARDING UNCONDITIONAL (CFU)

MCF/CA INTERFACE EVENT	MCF/CA INTERFACE	SIP REQ/RESP	SIP HEADERS/ PARAMETERS	EVT (OPN)	SIP EXTENSION PARAMETERS	NOTES
330 — INFODIR FROM HLR TO CA	IS-41	INFO	TO:MIN	CFU	TREATMENT CODE	MCF APPLIES THE A SINGLE ABBREVIATED ALERT TONE TO MS VIA PDSN BASED ON ALERT CODE
332 — FLASH WITH INFO ACK FROM MS	IS-634	1xx 200 OK	FROM:MIN	NONE	NONE	RESPONSE SENT TO CA

Method and System for Providing Wireless-Specific Services for a Wireless Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
Sheet 13 of 16   Filed: July 18, 2001

FIG. 11e

SIP MESSAGES FOR CALL FORWARDING NO ANSWER (CFNA)

MCF/CA INTERFACE EVENT	MCF/CA INTERFACE	SIP REQ/RESP	SIP HEADERS/ PARAMETERS	EVT (OPN)	SIP EXTENSION PARAMETERS	NOTES
PAGE OR ANSWER TIMEOUT	IS-634	408 REQUEST TIMEOUT	TO:CLDNO. FROM:MIN	NONE	NONE	

334

FIG. 11f

SIP MESSAGES FOR CALL WAITING

MCF/CA INTERFACE EVENT	MCF/CA INTERFACE	SIP REQ/RESP	SIP HEADERS/ PARAMETERS	EVT (OPN)	SIP EXTENSION PARAMETERS	NOTES
ISUP IAM	HOME MSC	INVITE	TO:MIN FROM:CLGNO	NONE	NONE	SECOND CALL REQUEST TO MS. MCF SENDS FLASHWITHINFORMATION
FLASHWITHINFORMATION (INITIAL RESPONSE) OR TIMEOUT	IS-634	200 / 406 NOT ACCEPTED	TO:CLGNNO FROM:MIN / AS ABOVE	NONE	NONE	IF MS ACCEPTS SECOND CALL THE FIRST TIME / MS DOES NOT ACCEPT SECOND CALL
FLASHWITHINFORMATION (SUBSEQUENTLY)	IS-634	INFO	TO:CLGNNO FROM:MIN	FLASH	NONE	SUBSEQUENTLY WHEN MS SWITCHES TO OTHER CALL LEG

336
338
340

Method and System for Providing Wireless-Specific Services for a Wireless Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
Sheet 14 of 16   Filed: July 18, 2001

FIG. 11g

SIP MESSAGES FOR VOICE MAIL WAITING NOTIFICATION

MCF/CA INTERFACE EVENT	MCF/CA INTERFACE	SIP REQ/RESP	SIP HEADERS/ PARAMETERS	EVT (OPN)	SIP EXTENSION PARAMETERS	NOTES
QUALDIR REQUEST FROM HLR	IS-41	INFO	TO:MIN	NOTIFY	MSGWAITNOTIFICATIONCOUNT MSGWAITNOTIFICATIONTYPE	HLR NOTIFIES CA VIA QUALIFICATIONDIRECTIVE WITH MSGWAITNOTIFICATIONCOUNT AND MSGWAITNOTIFICATIONTYPE. CA WILL FORWARD THE NOTIFICATION USING INFO MSG WITH MSG WAITING INDICATION PARAMETER TO MCF. IF MS IS REGISTERED OTHERWISE WAITS FOR THE MS TO REGISTER
QUALDIR RESP TO HLR FROM CA	IS-41	200 OK 4xx	FROM:MIN	NONE	NONE	MCF RESPONSE TO CA FOR MSGWAITINGNOTIFICATION AND CA RESPONDS TO HLR

342

344

Method and System for Providing
Wireless-Specific Services for a Wireless
Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
Sheet 15 of 16   Filed: July 18, 2001

FIG. 11h

SIP MESSAGES FOR VOICE MESSAGE RETRIEVAL

MCF/CA INTERFACE EVENT	MCF/CA INTERFACE	SIP REQ/RESP	SIP HEADERS/ PARAMETERS	EVT (OPN)	SIP EXTENSION PARAMETERS	NOTES
CM_SERVICE_REQUEST FROM MS	IS-634	INVITE	TO:MIN FROM:MIN	NONE	NONE	CA DETECTS REVERTIVE CALL WHEN MS DIALS IT'S OWN NUMBER. CA SENDS LOCREQ TO HLR IF VOICE MESSAGE SERVER IS NOT CONFIGURED ON THE CA
LOCATIONREQUEST RESPONSE FROM HLR	IS-41	1xx 200 OK	TO:MIN	NONE	NONE	LOCATION REQUEST RESPONSE CONTAINS THE TERMLIST PARAMETERS WHICH WILL CONTAIN THE DESTINATION DIGITS OF THE VOICE MAIL SERVER. CA PERFORMS ROUTING TO THE VOICE MAIL SERVER AND SETS UP THE CONNECTION TO VOICE MAIL SERVER. MCF HANDLES THE RESPONSE FROM CA AND SETS UP THE BEARER PATH

346
348

FIG. 11i

SIP MESSAGES FOR CALLING NAME PRESENTATION AND RESTRICTION (CNAP AND CNAR)

MCF/CA INTERFACE EVENT	MCF/CA INTERFACE	SIP REQ/RESP	SIP HEADERS/ PARAMETERS	EVT (OPN)	SIP EXTENSION PARAMETERS	NOTES
ISUP IAM	PSTN/MSC I/F	INVITE	TO:MIN	NONE	CGNAME	CA INCLUDES THE CALLING NAME IN THE EXTENSION PARAMETERS

350

Method and System for Providing Wireless-Specific Services for a Wireless Network
Inventors: Dantu, et al.
Attorney's Docket No.: 062891.0570
Sheet 16 of 16   Filed: July 18, 2001

FIG. 12